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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/870,463	06/01/2001	Michael Catherwood	18153.0032	8440

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EXAMINER

COLEMAN, ERIC

ART UNIT PAPER NUMBER

2183

DATE MAILED: 04/14/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/870,463

Applicant(s)

CATHERWOOD ET AL.

Examiner

Eric Coleman

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date NO. 2.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

### DETAILED ACTION

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

### ***Claim Rejections - 35 USC § 103***

2. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (patent No. 6,145,049) in view of Lambrecht (patent No. 6,205,467).
3. Wong taught the invention substantially as claimed including a data processing ("DP") system comprising:
  - a) Means method for fetching and decoding a shadow register file control instruction (e.g., see figs. 1,2, and col. 4, lines 59- 67, and col. 7, lines 7-63, col. 9, lines 7-17);
  - b) Means and method for executing the shadow register file control instruction on data stored in a source register file to write the data from the source register file to a destination register file the shadow register file control instruction configured to provide a fast context save during interrupt and non interrupt processing (e.g., see figs. 1,2 and col. 5, lines 9-20 and col. 13, lines 13-30);
  - c) Primary set of registers (110) (e.g., see figs. 5,6,7);
  - d) Shadow set of registers (100) (e.g., see figs. 5,6,7); and

e) Instruction memory (15)(e.g., see col. 6, lines 24-57).

4. Wong did not expressly detail (claims 1,11) that the fast context save was configured to during non-interrupt processing. Lambrecht, however taught the saving of context during interrupt and non-interrupt processing (e.g., see fig. 3 and col. 3, lines 37-65).

5. It would have been obvious to one of ordinary skill in the to combine the teachings of Wong and Lambrecht. The addition of the saving of the registers at predetermined times such as taught by Lambrecht would have allowed the Wong system eliminate the need to save the context when the interrupt occurred that would speed processing of interrupts.

6. As to the register file configuration being an array this limitation was not specified by the Wong and Lambrecht references. However the configuration of the registers in an array was well known in the art at the time at the time of the claimed invention. Also one of ordinary skill would have been motivated to use register files configured as an array in order to more efficiently access the data stored therein.

7. As per claims 2,3,12,13 Wong taught the instruction for saving the context saved the context from a primary or current registers to shadow registers (e.g., see figs. 5,6,7, and col. 13, lines 1-60).

8. As per claims 4,8,14,18 Lambrecht taught detecting an interrupt condition has occurred (e.g., see col. 5, lines 13-55).

9. As per claims 5,15, Wong and Lambrecht did not specifically detail an instruction register. However Since the Wong reference indicates the use of MMX architecture

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(e.g., see col. 1, lines 27-59). Therefore the system would have included an instruction register to store the instruction to be executed. Therefore, it would have been obvious to one of ordinary skill that the Wong would have stored the instruction that saved the context in the instruction register for executing the instruction in servicing an interrupt. Further as to the program counter limitation of claim 11, the MMX architecture taught by the Wong reference comprised a program counter.

10. As per claims 6,7,16,17, Wong taught an instruction that restores the data from shadow register set to the internal registers (e.g. see col. 19, lines 31-41).

11. As per claim 9,19, Wong taught executing the interrupt routing and returning from the interrupt (e.g., see col. 13, lines 13-30). Wong did not specifically detail automatic context save in the return was disabled. However Lambrecht taught a system where the context saves were performed independent of start and return from an interrupt (e.g., see fig. 3 and col. 3, lines 37-65). One of ordinary skill implementing the Wong system would have been motivated to disable the saving linked to the interrupt when using the added teachings of Lambrecht of context saves at predetermined times in order to prevent unnecessary operations as the context would have been already saved at return time because the saves would have occurred during the interrupt.

As per claims 10,20, Lambrecht taught executing the register control instruction before the execution of the return from the interrupting routine (e.g., see col. 6, lines 46-62 and col. 8, lines 25-58).

### ***Conclusion***

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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Wright (patent no. 6,101,599) disclosed a system for context switching between processing elements (e.g., see abstract).

Dowling (patent No. 6,487,654) disclosed a system with virtual shadow registers (e.g., see abstract).

Broadnax (patent No. 5,568,308) disclosed a shadow register file for instruction rollback (e.g., see abstract).

Cheng (patent No. 6,243,804) disclosed a single cycle transition pipeline processing using shadow registers (e.g., see abstract).

MacDonald (patent No. 6,295,574) disclosed a system with real-time interrupt handling (e.g., see abstract).

Clift (patent No. 6,633,970) disclosed a processor with primary and shadow array (e.g., see fig.1).

Dutton (patent No. 5,944,916) disclosed a microprocessor configured to execute multiple threads including interrupt service routines (e.g., see abstract).

Song (patent No. 6,061,711) disclosed a system with efficient context saving and restoring (e.g., see abstract).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric Coleman whose telephone number is (703) 305-9674. The examiner can normally be reached on Monday-Thursday.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Chan can be reached on (703) 305-9712. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EC

April 8, 2004

  
ERIC COLEMAN  
PRIMARY EXAMINER